National Renewable Energy Laboratory
Innovation for Our Energy Future

RECs Outlook and Carbon Issues

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Lori Bird, NREL

Overview

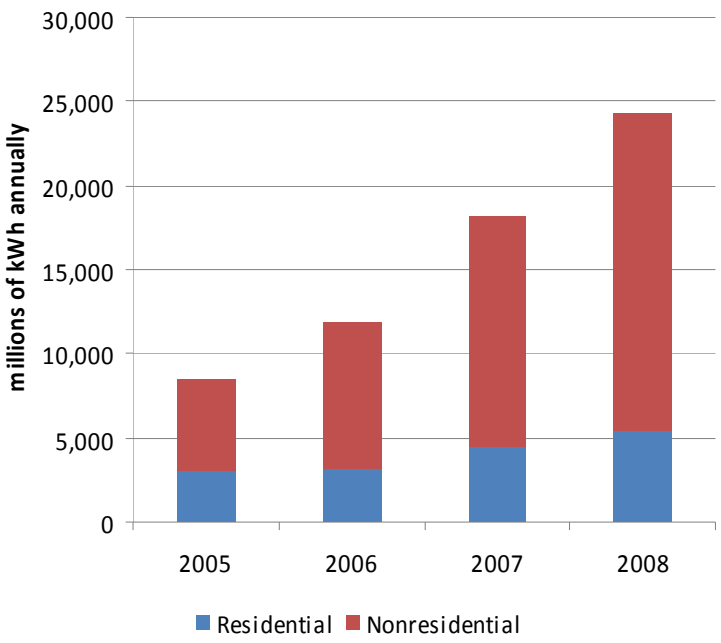
- Update on REC markets and prices, impact of financial crisis, proposed federal legislation
- Focus on carbon issues and intersection of markets
  - Can RECs be used to achieve carbon reduction goals?
  - What is the difference between offsets and RECs?
  - How are they used now?
  - What will be the effect of carbon cap and trade?

U.S. Voluntary Green Power Sales

Market Segment	% Change 2008
Utility Green Pricing	9%
Competitive Markets	22%
REC Markets	47%
Retail Total	**34%**

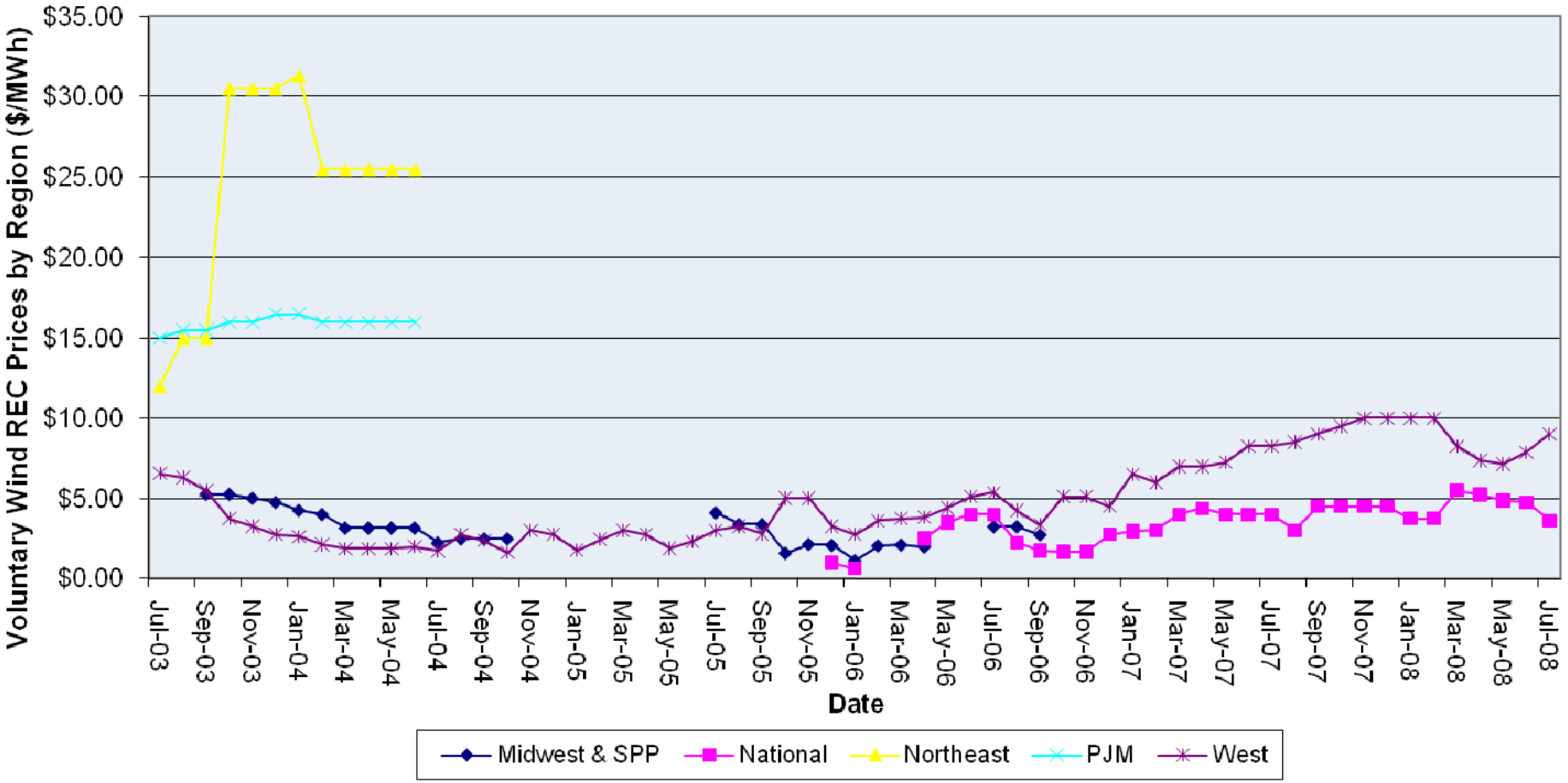
REC market sales leading the growth; utility programs slower growth (impacted by loss of FPL)

Nonresidential Purchases Continue to Dominate



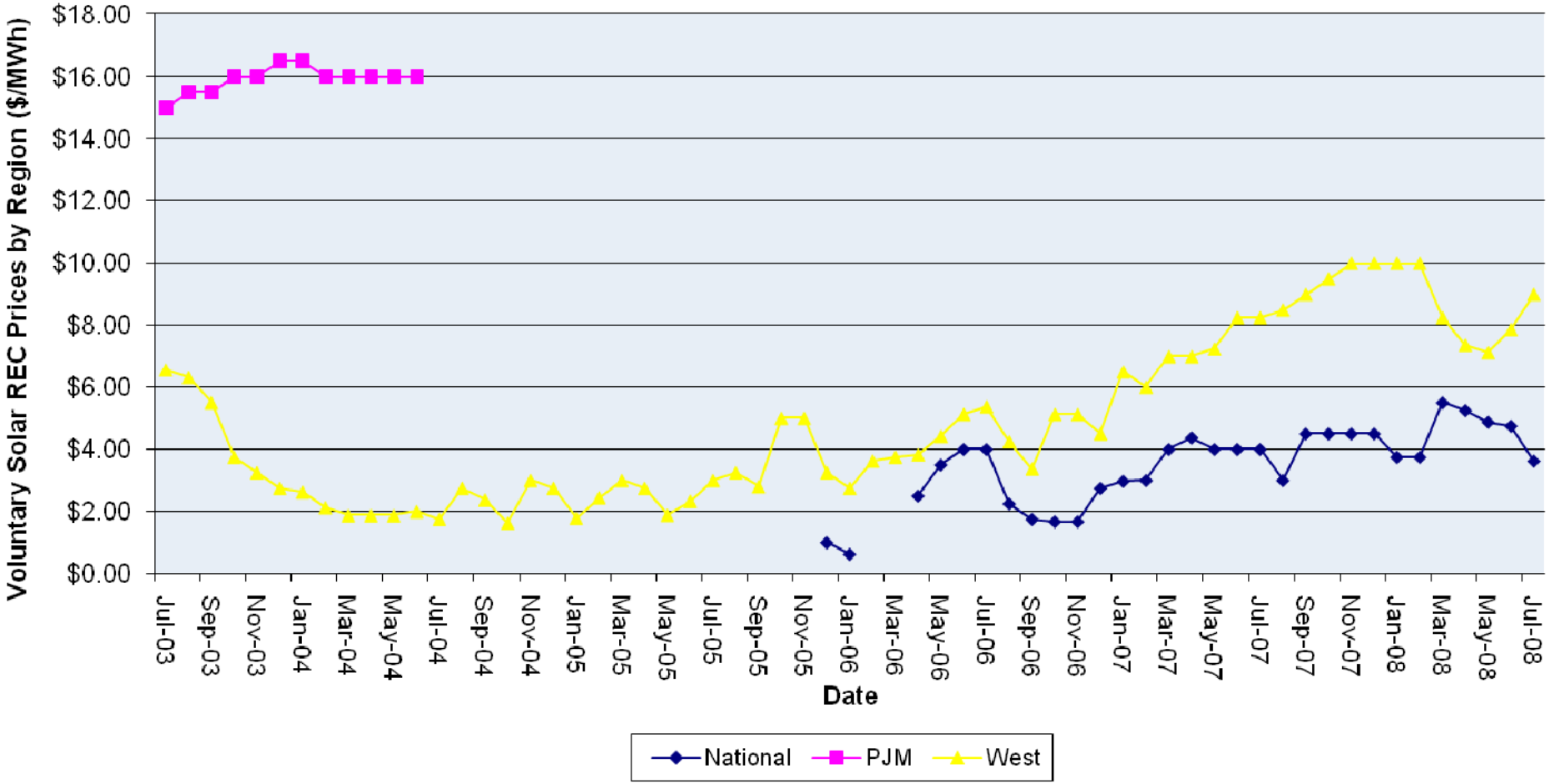
- Large new purchases in first half of 2008 drove bulk of increase
- Slowed in second half 2008, shift to smaller, new purchases
- Some commercial customers reducing purchase size
- What about 2009?
  - EPA Green Power Partnership Program had substantial growth in new Partners in 2009 (200 new partners from 1100)
  - Approx. 4% increase in EPA GPP purchases through 8/09 to 17.4 million MWh

Average Prices for Voluntary Wind RECs by Region



PJM has members in 13 states and the District of Columbia: Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. **SPP** has members in nine states: Arkansas, Kansas, Louisiana, Mississippi, Missouri, Nebraska, New Mexico, Oklahoma, and Texas.

Average Prices for Voluntary Solar RECS by Region



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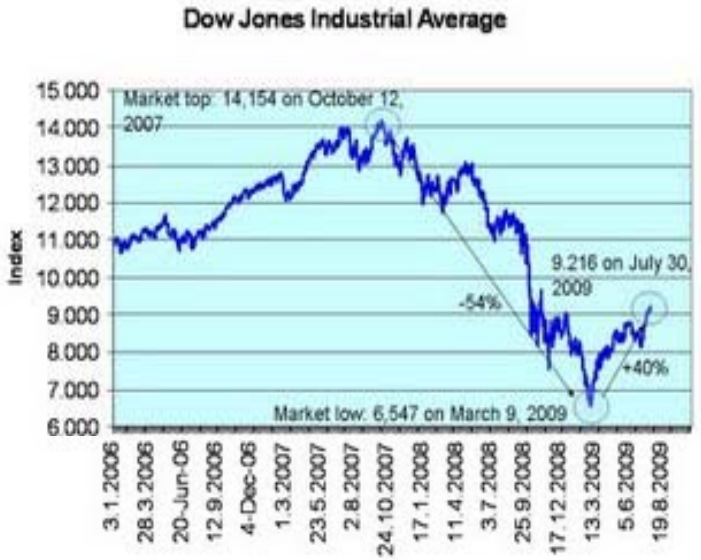
Overall Solid Growth in 2008, But 2009?

- Limited data on 2009 so far, but growth in sales appears to be significantly slower
- Significant new commercial purchasers but smaller volume and some existing purchases cutting back
- Anecdotal information from utility programs about losing customers, others seem to be holding their own -- regional differences



Key Issues for Voluntary Markets Going Forward

Near term impact of the financial crisis on market participation

Interaction with state and potential federal RPS

- Interaction with federal REC trading system – dual REC system
- Who gets federal REC in pre-existing contracts?
- Competition for renewable energy supplies, as policies ramp up

Treatment of renewables under cap and trade programs

- Will renewables be able to sell carbon benefits once caps are in place?
- Will REC purchasers be able to claim that they have improved their carbon footprint (purchased electricity)?

RECs vs. Offsets

RECs vs. Offsets -- What is the difference?

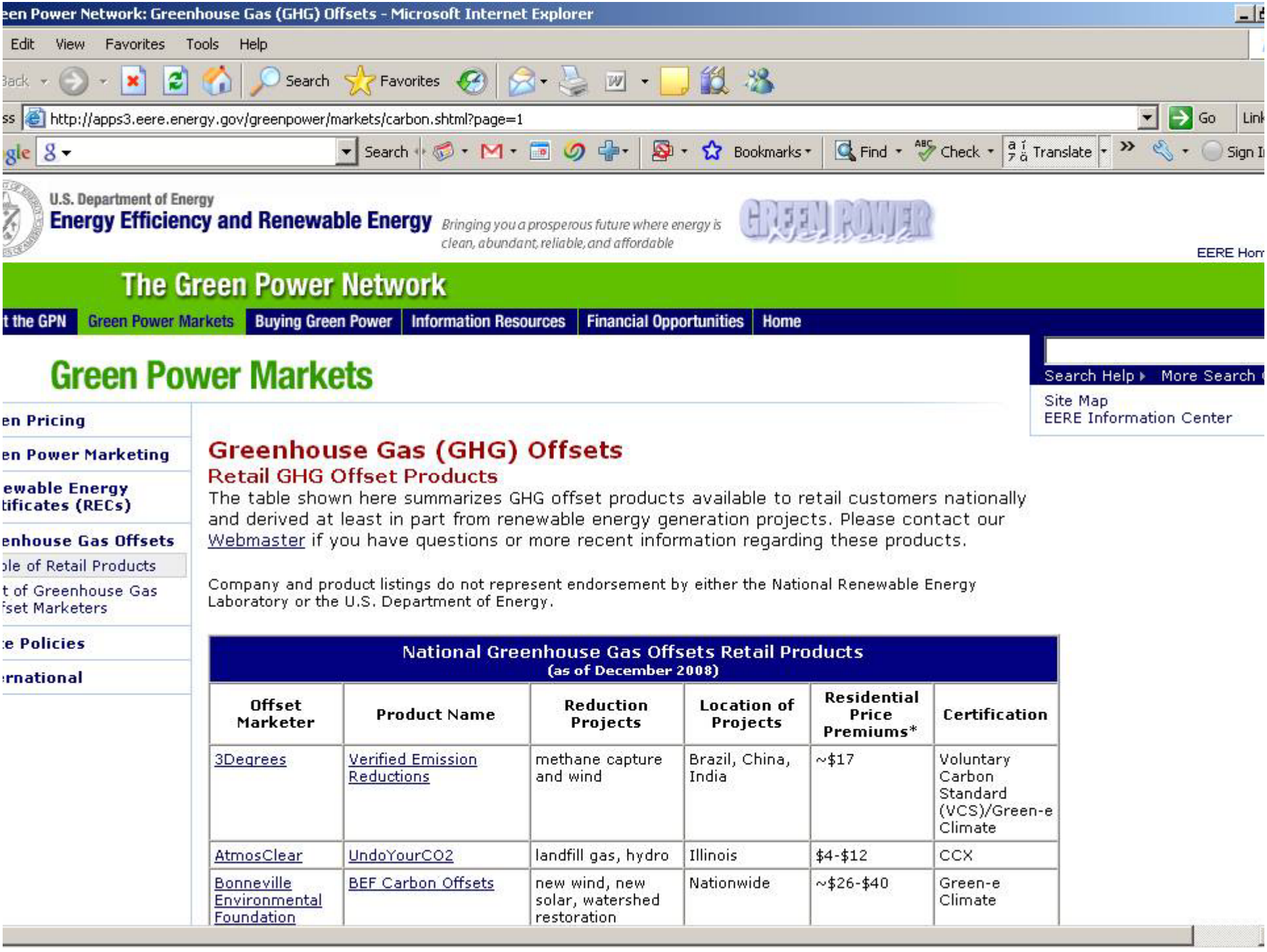
- RECs – sold in kWh and matched with electricity usage
  - Additional to regulatory requirements (RPS)
- GHG Offsets – sold in tons of CO2 and used to address CO2 emissions
  - Must be additional to business as usual (meet additionality tests, which can differ by certification standard)
  - Can be sourced from RE, EE, forestry, methane projects etc.

Double counting concerns – can same MWh of renewables be sold as both a REC and an offset?

Both are currently used to make carbon emissions reduction claims, but RECs are limited to electricity-based emissions

Renewable Energy as GHG Offsets

- Renewables, efficiency are dominant source of offsets internationally under Kyoto protocol Clean Development Mechanism and Joint Implementation
- A voluntary market for RE and EE-based offsets in U.S. exists, but cap and trade design will determine future
- 25+ U.S. marketers selling GHG offsets sourced in part from renewables, retail price range from $5-$40/ton
- In U.S., electricity-based renewables will not provide compliance offsets under cap/trade, because under regulated sector
    - Only renewables (biogas digestors, landfill gas, solar hot water, etc.) that reduce methane or other direct emissions could be offsets



een Power Network: Greenhouse Gas (GHG) Offsets - Microsoft Internet Explorer
Edit View Favorites Tools Help
http://apps3.eere.energy.gov/greenpower/markets/carbon.shtml?page=1
U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable
The Green Power Network
t the GPN | Green Power Markets | Buying Green Power | Information Resources | Financial Opportunities | Home
Search Help | More Search
Site Map
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Green Power Markets
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ewable Energy tificates (RECs)
enhouse Gas Offsets
ble of Retail Products
t of Greenhouse Gas fset Marketers
e Policies
rnational
Greenhouse Gas (GHG) Offsets
Retail GHG Offset Products
The table shown here summarizes GHG offset products available to retail customers nationally and derived at least in part from renewable energy generation projects. Please contact our Webmaster if you have questions or more recent information regarding these products.
Company and product listings do not represent endorsement by either the National Renewable Energy Laboratory or the U.S. Department of Energy.
National Greenhouse Gas Offsets Retail Products
(as of December 2008)
Offset Marketer	Product Name	Reduction Projects	Location of Projects	Residential Price Premiums*	Certification
3Degrees	Verified Emission Reductions	methane capture and wind	Brazil, China, India	~$17	Voluntary Carbon Standard (VCS)/Green-e Climate
AtmosClear	UndoYourCO2	landfill gas, hydro	Illinois	$4-$12	CCX
Bonneville Environmental Foundation	BEF Carbon Offsets	new wind, new solar, watershed restoration	Nationwide	~$26-$40	Green-e Climate

Offset Quality and Standards

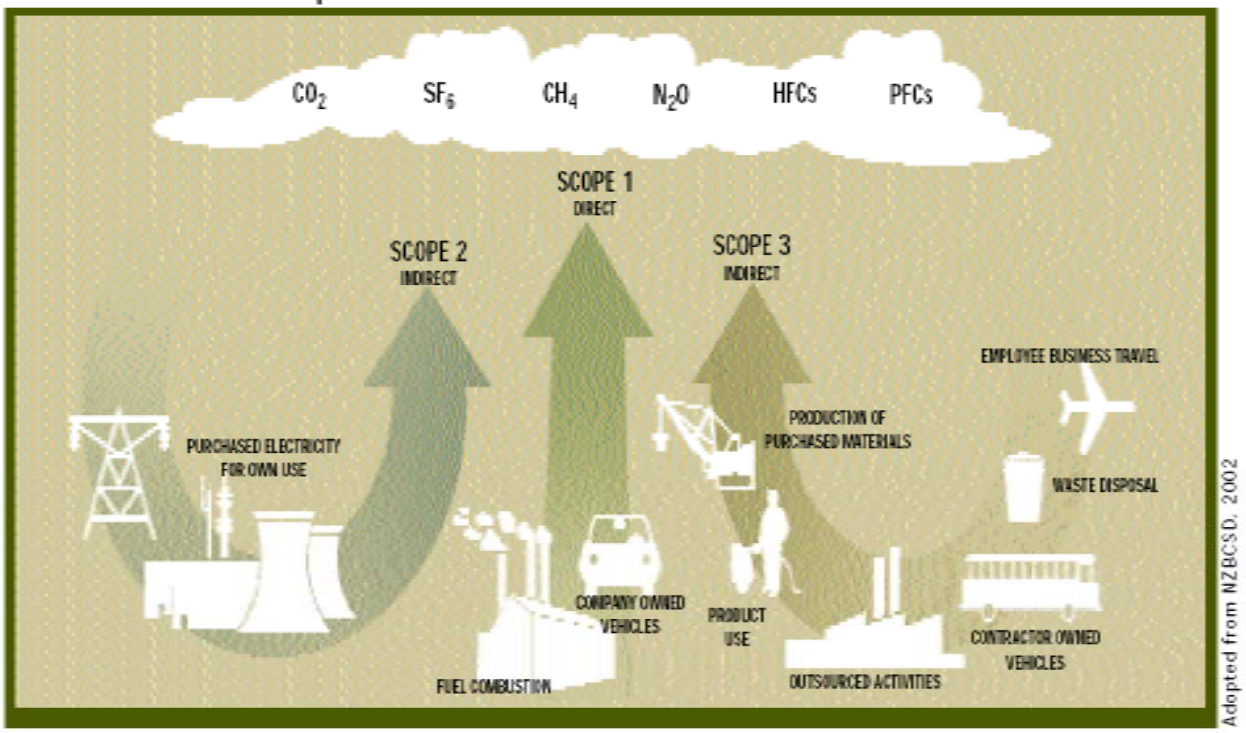
- General consensus that offsets need to meet five basic criteria to ensure they are credible (RSVPE):
  - **Real** – can the reductions be measured?
  - **Surplus or additional** – are the emissions reductions beyond business as usual, regulatory requirements etc. – "additionality"
  - **Verified** – are the reductions verified by 3rd party?
  - **Permanent** – emissions reductions will remain in future (issue for forestry projects in particular)
  - **Enforceable** – "ownership" for RE and EE issue is who owns the emission reduction (the renewable or fossil plant that generated less?)
- Key issues for RE/EE are "additionality" and "ownership" of the emission reduction
- Certifiers have different ways of measuring or evaluating whether these criteria are met
- Certifiers include: Voluntary Carbon Standard, Gold Standard, CCX, Green-e Climate (distinct from Green-e Energy)

RECs and Offsets in Carbon Accounting

- Key Question: How can RECs and RE-derived offsets be used to address an entity's carbon footprint?
- Accounting Methods Differ: GHG emitters can develop internal GHG inventories or can participate in public inventories
- WRI GHG Protocol provides guidance for inventories and addressing emissions

GHG Accounting: Direct vs. Indirect Emissions

FIGURE 3. Overview of scopes and emissions across a value chain



Direct emissions – emitted directly by facility and under its control
Indirect emissions – not emitted directly by facility and emission source under the control of another entity

Source: World Resources Institute GHG Protocol

Using RECs, Offsets in Carbon Accounting

RECs generally matched with electricity usage; often used to displace electricity-based emissions

- Is it best to match RECs with kWh of electricity used or CO2 emissions avoided from RECs? (little guidance on this; both practiced)
- Do RECs need to pass an "additionality" screen to apply to RECs to purchased electricity emissions? (Climate Leaders requires)

Offsets can be used for other GHG emissions as well

- Tons CO2 can be matched with direct emissions from vehicle usage, facility heating, etc.
- Can electricity-based RE/EE offsets be applied to direct emissions? Controversial. (ownership issue and concern about forthcoming carbon caps are issue)

How Do GHG Inventories Address RECs?

What are rules for public inventories?

EPA Climate Leaders

- Allows RECs to be used to make an adjustment to Scope 2 emissions, requires additionality, provides calculation guidance; RE cannot be used as an offset of direct emissions (Scope 1)

California Climate Action Registry

- Allows RECs to be provided as supplemental information to Scope 2 emissions

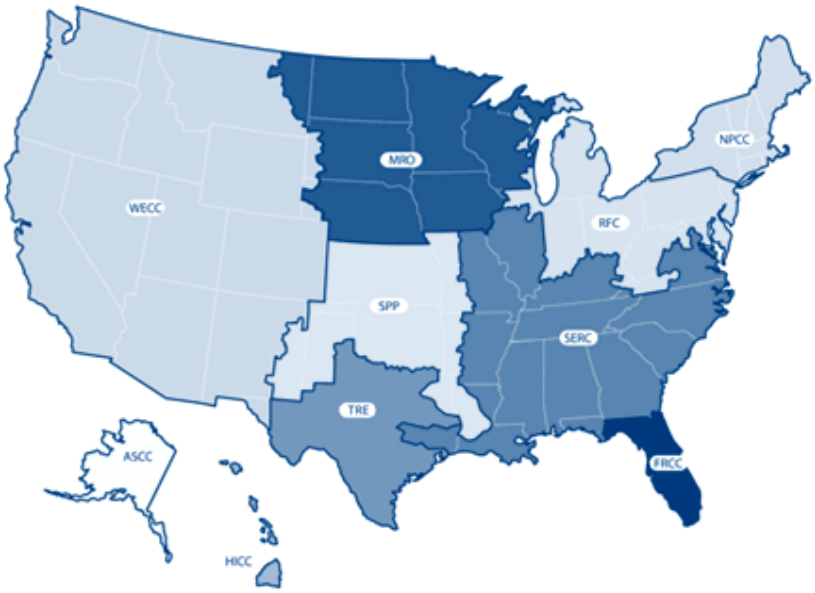
Climate Registry

- Plans to issue protocol or guidance early next year; plan is to allow reporters ability to report scope 2 emissions in two ways, one that recognizes emissions intensity of REC purchases

Calculating Avoided GHG Emissions

- Renewable energy avoids emissions from fossil plants, provides indirect emissions benefit
- What is the size of the “avoided” emissions benefit?
  - Difficult to get accurate answer because displaced emissions can vary daily and hourly
  - Need to determine the emissions of the last plant (marginal unit) that would have come online if RE was not operating
  - Detailed regional power sector modeling needed to determine the actual avoided emissions, but simplified methods available
- Simplified method – EPA eGRID nonbaseload emissions factors are proxy for marginal rates
  - used by EPA Climate Leaders, Green-e Climate

CO2 Avoided Varies Significantly By Region



Source: U.S. EPA eGRID database

Region	Average CO2 Emissions lbs/MWh	Non-baseload CO2 emissions lbs/MWh
California WECC – CA	724	1,083
Midwest MRO – West	1,821	2,158
MidAtlantic RFC – East	1,139	1,790
Texas ERCOT	1,324	1,118

Best practice is to calculate avoided emissions by location of renewable energy generator

What is the Effect of Carbon Caps?

- Under cap and trade, renewables displace emissions from fossil fuel facilities but don't "own" reductions
- Cap and trade allows the fossil facilities to trade those reductions to others or emit more (emissions stay at level of cap)
- What does this mean for renewables?
  - RE cannot be a carbon offset and has no carbon value
  - REC can still be sold – RPS markets will persist and voluntary purchasers still may want to purchase RECs to support the technology or for its other benefits

Voluntary RE Market Set Asides

- Regional Greenhouse Gas Initiative (RGGI) states adopted “voluntary market set aside”
  - CO2 allowances are retired on behalf of voluntary renewable energy purchases
  - Enables REC to retain CO2 value
- California GHG Law (AB32) Scoping Plan includes plan to enable voluntary RE purchases to reduce emissions
- In absence of set aside, can RE purchasers still make limited claims about the carbon benefits of purchasing RE for their own electricity usage (scope 2 emissions)?
  - No consensus – topic still being debated

Summary of Key Carbon/REC Issues

- Today RE facilities can sell RECs and/or carbon, but under caps there is no carbon value unless set aside
- Do RECs need to pass “additionality” tests for purchaser to make CO2 claims (carbon footprint)?
- Is it best practice to match RECs with kWh of electricity usage or match CO2 avoided?
- After caps take effect, can RE purchasers make claims about the carbon benefits of purchasing RE for their own electricity usage (scope 2 emissions) if no set aside?